UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P O Box 1450
Alexandria, Virginia 22313-1450
www uspto gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,118	03/10/2004	Shigekazu Harada	00380377AA	2471

30743 7590 08/27/2008
WHITHAM, CURTIS & CHRISTOFFERSON & COOK, P.C.
11491 SUNSET HILLS ROAD
SUITE 340
RESTON, VA 20190

EXAMINER	
LIU, LI	
ART UNIT	**PAPER NUMBER**
2613	
MAIL DATE	**DELIVERY MODE**
08/27/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/796,118	HARADA, SHIGEKAZU	
	Examiner	**Art Unit**	
	LI LIU	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 14 June 2008.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-16,20 and 21 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-16,20 and 21 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 10 March 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/14/2008 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 1-16, 20 and 21 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

3. Claim 20 is objected to because of the following informalities: claim 20 line 8, "a selected wavelength form an optical" should be changed to "a selected wavelength from an optical". Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-16, 20 and 21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject

matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

1). Claims 1 and 13, and thus the depending claims 2-12 and 14-16, recites the limitation "wavelength control means which determines whether the selected wavelength is a used wavelength or an unused wavelength on the basis of the reception status signal, and controls the wavelength selecting means until the unused wavelength is selected by the wavelength selecting means". However, the original disclosure does not disclose that the wavelength control means controls the wavelength selecting means. The original disclosure teaches that the wavelength control means controls the wavelength separating means (21-n in Figures 2 and 3) to control a wavelength to be separated. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

2). Claim 20, and thus the depending claim 21, recites the limitation "controlling the wavelength selecting means until the unused wavelength is selected by the selecting step". However, the original disclosure does not disclose that the wavelength control means controls the wavelength selecting means. The original disclosure teaches that the wavelength control means controls the wavelength separating means (21-n in Figures 2 and 3) to control a wavelength to be separated. The claim contains subject matter which was not described in the specification in such a way as to reasonably

convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

6. Claims 1-16, 20 and 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

1). Claims 1 and 13, and thus the depending claims 2-12 and 14-16, recites the limitation "wavelength selecting means which selects a wavelength; wavelength separating means which separates an optical signal of a selected wavelength from an optical signal including a plurality of wavelengths". The applicant tries to claim a coupler (5 or 6 in Fig. 2) or a wavelength de/multiplexer (7 or 8 in Fig. 3) by the phrase "wavelength selecting means"; and to claim a wavelength filter (21-n in Figures 2 and 3) by the phrase "wavelength separating means". However, if the "wavelength selecting means" is a coupler, it will "perform optical branching and optical coupling at a branching ratio according to the number of remote apparatuses", that is all wavelengths will be branched to every remote apparatus, the coupler cannot select a wavelength. If the "wavelength selecting means" is a demultiplexer, it will "demultiplexes a wavelength-multiplexed optical signal into signals with different wavelength" and "Each remote apparatus 2-1-2-n receives only one of the optical signals 2011-201n that has a particular wavelength", that is the wavelength separating means (or the wavelength filter) will receive only a specific wavelength which is selected by the demultiplexer, the wavelength separating means (or the wavelength filter) does not separate an optical signal of a selected wavelength from an optical signal including a plurality of

wavelengths. The claim 1 and 13, and thus the depending claims 2-12 and 14-16, fail to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

2). Claim 20, and thus the depending claim 21, recites the limitation "selecting a wavelength; separating an optical signal of a selected wavelength from an optical signal including a plurality of wavelengths". The applicant tries to claim a coupler (5 or 6 in Fig. 2) or a wavelength de/multiplexer (7 or 8 in Fig. 3) by the phrase "selecting a wavelength"; and to claim a wavelength filter (21-n in Figures 2 and 3) by the phrase "separating an optical signal of a selected wavelength from an optical signal including a plurality of wavelengths". However, if a coupler is used for "selecting a wavelength", it will "perform optical branching and optical coupling at a branching ratio according to the number of remote apparatuses", that is all wavelengths will be branched to every remote apparatus, the coupler cannot select a wavelength. If a demultiplexer is used to select a wavelength, it will "demultiplexes a wavelength-multiplexed optical signal into signals with different wavelength" and "Each remote apparatus 2-1-2-n receives only one of the optical signals 2011-201n that has a particular wavelength", that is the wavelength separating means (or the wavelength filter) will receive only a specific wavelength which is selected by the demultiplexer, the wavelength separating means (or the wavelength filter) does not separate an optical signal of a selected wavelength from an optical signal including a plurality of wavelengths. The claim 20, and thus the depending claim 21, fails to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claim1-4, 8-16, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (AAPA: Figure1 and the Background of the Invention) in view of Majima (US 6,101,014) and Nakamura et al (US 5,212,577).

1). With regard to claim 1, the AAPA discloses a wavelength division multiplexing transmission system (Figure 1) in which a plurality of remote apparatuses (20-1 to 20-m in Figure 1) are connected to a station apparatus (10 in Figure 1) which communicates with said remote apparatuses (Background of the Invention) using a given plurality of wavelengths (Background of the Invention: the system is a wavelength multiplexing transmission system, each ONU transmits and receives different wavelength) wherein each of said remote apparatuses comprises:

wavelength selecting means (e.g., the wavelength demultiplexer 7 in Figure 1 of AAPA) which selects a wavelength;

signal output means (the optical receiver 220-1 to 220-m in Figure 1) which outputs a reception status signal (the receiver receives the selected signal and outputs a reception status signal, based on the status signal, the maintainer/personnel sets the

wavelength control means to output a specific wavelength, page 2 line 10 to page 3 line 11);

wavelength control means (the wavelength controller 240-1 to 240-n which controls the wavelengths of optical signals to be transmitted from the optical transmitter 230-1 to 230-n, page 3, line 8-11) which determines the wavelength to be transmitted; and

optical transmitting means (the optical transmitter 230-1 to 230-m in Figure 1) which transmits an optical signal of the unused-wavelength determined by said wavelength control means.

The AAPA teaches that the optical transmitter 230-m of the **newly added** remote apparatus 20-m contains a wavelength tunable laser. The output wavelength of the wavelength tunable laser must be **controlled** so as to be the wavelength assigned to the remote apparatus 20-m **through the use of a wavelength controller** (page 3, line 8-11). But, in FIG. 1, each time a new remote apparatus is installed, a wavelength to be used in that system must be set by a maintainer or other personnel.

The AAPA fails to teach: wavelength separating means which separates an optical signal of a selected wavelength from an optical signal including a plurality of wavelengths; and the reception status signal indicating whether or not a separated optical signal is received from the wavelength separating means; and wavelength control means which determines whether the selected wavelength is a used wavelength or an unused wavelength on the basis of the reception status signal, and controls the

wavelength selecting means until the unused wavelength is selected by the wavelength selecting means.

However, Majima, in the same field of endeavor, teaches a system and method (Figure 4 and Figure 5) in which a wavelength separating means (e.g., the optical filter 503 in Figure 5) separates an optical signal of a selected wavelength from an optical signal including a plurality of wavelengths, the optical receiving means (the Light Receiving Element and the Discriminator in Figure 5) for outputting reception status signal indicating whether or not a separated optical signal is received from the wavelength separating means (Majima discloses that each sending terminal station performs sweeping to detect any transmission wavelength of another station which may exist on the transmission line, column 9, line 49-54; and FIG. 2A shows two continuous wavelength tunable ranges available on the tunable LD 502. Solid vertical lines show the **used wavelengths**, while broken vertical lines show the **candidate wavelengths or available wavelength**. Majima teaches that the discriminator 508 produces a signal H (digital signal "1") when the level of the input signal is not smaller than the threshold value, otherwise it produces a signal L (digital signal "0")); and wavelength control means for determining an available wavelength as a transmission and reception signal on the basis of said reception status signal (the wavelength control system 501 controls the tunable LD driver circuit 504 based on a signal outputted from the discriminator 508, thereby performing the control of the wavelength, column 6, line 54-57), and controls the wavelength selecting means until the unused wavelength is selected by the wavelength selecting means (the control system 501 and tunable optical filter driver

circuit 505 control the filter 503 to sweep the wavelength to find the available wavelength.

Majima teaches that the transmitting terminal station controls the wavelength tunable optical transmitter such that the transmitter transmits light of a wavelength which is not being used on the network communication transmission line. Majima's method also can be carried out such that the delivery of the output light from the light-emitting means to the transmitting line is prohibited until the wavelength of the output light is set not to interfere with the other light. Thus, the delivery of the output light is controlled to avoid any interference which otherwise may be caused by delivering light of a wavelength which risks interference (column 4, line 30-47). Ref to Figures 1 and 2, wavelengths indicated by broken vertical lines are located as the candidates of the transmission wavelength to be set.

Majima teaches to find the available wavelength. Majima does not expressly state that the available wavelength is the used or unused wavelength.

Another prior art, Nakamura et al, also teaches a system and method which provides a specific signal detection means finding out a communication available wavelength not in use from an available wavelength region at desired transmission and detecting a communication destination specific signal when a communication request is detected. Nakamura et al discloses a wavelength selecting means (e.g., 32 in Figure 1), wavelength separating means (e.g., 55 in Figure 2), an optical receiving means (the photodiode 54 in Figure 2) for outputting reception status signal indicating whether or not a separated optical signal is received from the wavelength separating means

(column 6, line 43 to column 7 line 27, and column 8 lien 49-54); and wavelength control means (the control circuit 51, 112, 605 etc in Figures 2, 5, 7 and 8) for determines whether the selected wavelength is a used wavelength or an unused wavelength on the basis of the reception status signal (Figures 3 and 9-11) and controls the wavelength selecting means until the unused wavelength is selected by the wavelength separating means (column 6, line 43 to column 7 line 27, and column 8 lien 49-54, and column 11 line 19 to 51 etc).

As disclosed by the AAPA, for a conventional system, each time a new remote apparatus is installed, a wavelength to be used in that system must be set by a maintainer or other personnel. And collisions between signals may occur and action must be taken to handle them.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the method and system of autonomously controlling and setting of an available wavelength or unused wavelength as taught by Majima and Nakamura et al to the system of applicant admitted prior art so that the controller can get the reception status information from the receiver, and then desired wavelength for reception and transmitting can be easily and automatically selected based on the received information, and then no man-hours are required while a new remote apparatus is added or updated.

2). With regard to claim 2, the AAPA and Majima and Nakamura et al disclose all of the subject matter as applied to claim 1 above. And the AAPA and Majima and Nakamura et al further disclose wherein said wavelength control means sets the unused

wavelength as a transmission and reception signal and outputs a wavelength control signal for setting the unused wavelength (Majima: the dotted line in Figures 1 and 2 indicated the unused wavelength; Figures 2, 4 and 5, the wavelength control system controls the tunable LD driver circuit based on a signal outputted from the discriminator, thereby performing the control of the wavelength, and, column 6, line 54-57; Nakamura et al: e.g., the $\lambda 1$ and $\lambda 2$ in Figure 3 are the unused wavelength, column 6, line 43 to column 7 line 27, and column 8 lien 49-54, and column 11 line 19 to 51 etc).

3). With regard to claim 3, the AAPA and Majima and Nakamura et al disclose all of the subject matter as applied to claim 1 above. And the AAPA and Majima and Nakamura et al further disclose wherein the wavelength control means determines a wavelength of an unreceived optical signal as the unused wavelength and sets the unused wavelength as a transmission and reception wavelength to be used in the remote apparatus (Majima: Figures 1 and 2, the unreceived wavelengths indicated by broken vertical lines are located as the candidates of the transmission wavelength to be set; ; Nakamura et al: e.g., the $\lambda 1$ and $\lambda 2$ in Figure 3 are the unused/unreceived wavelength, column 6, line 43 to column 7 line 27, and column 8 lien 49-54, and column 11 line 19 to 51 etc).

4). With regard to claim 4, the AAPA and Majima and Nakamura et al disclose all of the subject matter as applied to claim 1 above. But the AAPA and Majima and Nakamura et al do not expressly disclose wherein the wavelength control means determines a the wavelength of a received optical signal as the unused wavelength and

sets the unused wavelength as a transmission and reception wavelength to be used in the remote apparatus.

In Figure 4 of Majima, a star coupler is used so that the optical node receives all existing wavelength, then the optical node must determine an unused wavelength. However, as disclosed by the AAPA, a wavelength demultiplexer can be used to separate the wavelengths from the station apparatus 10, and each remote apparatus (e.g., 20-1) only receives one wavelength. Therefore, it is obvious to one skilled in the art to configure the wavelength controller so that the wavelength determining means determines the wavelength of a received optical signal as the available wavelength and sets the wavelength as a transmission and reception wavelength to be used in said remote apparatus.

5). With regard to claim 8, the AAPA and Majima and Nakamura et al disclose all of the subject matter as applied to claim 1 above. And the AAPA and Majima and Nakamura et al further disclose wherein each of the remote apparatuses and the station apparatus are connected with each other through optical branching and coupling means (7 and 8 in Figure 1 of the AAPA, or the star coupler in Figure 4 of Majima).

6). With regard to claim 9, the AAPA and Majima and Nakamura et al disclose all of the subject matter as applied to claim 1 above. And the AAPA and Majima and Nakamura et al further disclose wherein the optical branching and coupling means is an optical coupler (the star coupler in Figure 4 of Majima).

7). With regard to claim 10, the AAPA and Majima and Nakamura et al disclose all of the subject matter as applied to claim 1 above. And the AAPA and Majima and

Nakamura et al further disclose wherein the optical branching and coupling means is a wavelength demultiplexing and multiplexing means (7 and 8 in Figure 1 of the AAPA).

8). With regard to claim 11, the AAPA and Majima and Nakamura et al disclose all of the subject matter as applied to claim 1 above. And the AAPA and Majima and Nakamura et al further disclose wherein the plurality of remote apparatuses and the station apparatus are connected in a star topology (Figure 1 of the admitted prior is a star topology, page 2 line 9, and Figure 4 of Majima).

9). With regard to claim 12, the AAPA and Majima and Nakamura et al disclose all of the subject matter as applied to claim 1 above. But the AAPA and Majima and Nakamura et al do not expressly disclose wherein the plurality of remote apparatuses and the station apparatus are connected in a tree topology.

However, as the applicant state a tree system is just a configuration in which a number of remote apparatuses are connected to each other through a relay point such as a star coupler (page 1, line 17-20). So, the tree topology is just adding another "star" configuration to a star configuration. Therefore, Claim 12 is not patentable different from the star topology in admitted prior art in view of Majima and Nakamura et al, because it is "to duplicate a part for a multiple effect" (see St. Regis Paper Company v. Bemis Company, Inc., 193 USPQ 8 (CA 7 1977)).

10). With regard to claim 13, the AAPA discloses a remote apparatus (20-1 to 20-m in Figure 1) in a wavelength division multiplexing transmission system (Figure 1) in which a plurality of remote apparatuses are connected to a station apparatus (10 in Figure 1) and communication is performed among the remote apparatuses and the

station apparatus using a given plurality of wavelengths (Background of the Invention: the system is a wavelength multiplexing transmission system, each ONU transmits and receives different wavelength), said remote apparatus comprising:

wavelength selecting means (e.g., the wavelength demultiplexer 7 in Figure 1 of AAPA) which selects a wavelength;

signal output means (the optical receiver 220-1 to 220-m in Figure 1) which outputs a reception status signal (the receiver receives the selected signal and outputs a reception status signal, based on the status signal, the maintainer/personnel sets the wavelength control means to output a specific wavelength, page 2 line 10 to page 3 line 11);

wavelength control means (the wavelength controller 240-1 to 240-n which controls the wavelengths of optical signals to be transmitted from the optical transmitter 230-1 to 230-n, page 3, line 8-11) which determines the wavelength to be transmitted; and

optical transmitting means (the optical transmitter 230-1 to 230-m in Figure 1) which transmits an optical signal of the unused-wavelength determined by said wavelength control means.

The AAPA teaches that the optical transmitter 230-m of the **newly added** remote apparatus 20-m contains a wavelength tunable laser. The output wavelength of the wavelength tunable laser must be **controlled** so as to be the wavelength assigned to the remote apparatus 20-m **through the use of a wavelength controller** (page 3, line

8-11). But, in FIG. 1, each time a new remote apparatus is installed, a wavelength to be used in that system must be set by a maintainer or other personnel.

The AAPA fails to teach: wavelength separating means which separates an optical signal of a selected wavelength from an optical signal including a plurality of wavelengths; and the reception status signal indicating whether or not a separated optical signal is received from the wavelength separating means; and wavelength control means which determines whether the selected wavelength is a used wavelength or an unused wavelength on the basis of the reception status signal, and controls the wavelength selecting means until the unused wavelength is selected by the wavelength selecting means.

However, Majima, in the same field of endeavor, teaches a system and method (Figure 4 and Figure 5) in which a wavelength separating means (e.g., the optical filter 503 in Figure 5) separates an optical signal of a selected wavelength from an optical signal including a plurality of wavelengths, the optical receiving means (the Light Receiving Element and the Discriminator in Figure 5) for outputting reception status signal indicating whether or not a separated optical signal is received from the wavelength separating means (Majima discloses that each sending terminal station performs sweeping to detect any transmission wavelength of another station which may exist on the transmission line, column 9, line 49-54; and FIG. 2A shows two continuous wavelength tunable ranges available on the tunable LD 502. Solid vertical lines show the **used wavelengths**, while broken vertical lines show the **candidate wavelengths or available wavelength**. Majima teaches that the discriminator 508 produces a signal

H (digital signal "1") when the level of the input signal is not smaller than the threshold value, otherwise it produces a signal L (digital signal "0")); and wavelength control means for determining an available wavelength as a transmission and reception signal on the basis of said reception status signal (the wavelength control system 501 controls the tunable LD driver circuit 504 based on a signal outputted from the discriminator 508, thereby performing the control of the wavelength, column 6, line 54-57), and controls the wavelength selecting means until the unused wavelength is selected by the wavelength selecting means (the control system 501 and tunable optical filter driver circuit 505 control the filter 503 to sweep the wavelength to find the available wavelength.

Majima teaches that the transmitting terminal station controls the wavelength tunable optical transmitter such that the transmitter transmits light of a wavelength which is not being used on the network communication transmission line. Majima's method also can be carried out such that the delivery of the output light from the light-emitting means to the transmitting line is prohibited until the wavelength of the output light is set not to interfere with the other light. Thus, the delivery of the output light is controlled to avoid any interference which otherwise may be caused by delivering light of a wavelength which risks interference (column 4, line 30-47). Ref to Figures 1 and 2, wavelengths indicated by broken vertical lines are located as the candidates of the transmission wavelength to be set.

Majima teaches to find the available wavelength. Majima does not expressly state that the available wavelength is the used or unused wavelength.

Another prior art, Nakamura et al, also teach a system and method which provides a specific signal detection means finding out a communication available wavelength not in use from an available wavelength region at desired transmission and detecting a communication destination specific signal when a communication request is detected. Nakamura et al discloses a wavelength selecting means (e.g., 32 in Figure 1), wavelength separating means (e.g., 55 in Figure 2), an optical receiving means (the photodiode 54 in Figure 2) for outputting reception status signal indicating whether or not a separated optical signal is received from the wavelength separating means (column 6, line 43 to column 7 line 27, and column 8 lien 49-54); and wavelength control means (the control circuit 51, 112, 605 etc in Figures 2, 5, 7 and 8) for determines whether the selected wavelength is a used wavelength or an unused wavelength on the basis of the reception status signal (Figures 3 and 9-11) and controls the wavelength selecting means until the unused wavelength is selected by the wavelength separating means (column 6, line 43 to column 7 line 27, and column 8 lien 49-54, and column 11 line 19 to 51 etc).

As disclosed by the AAPA, for a conventional system, each time a new remote apparatus is installed, a wavelength to be used in that system must be set by a maintainer or other personnel. And collisions between signals may occur and action must be taken to handle them.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the method and system of autonomously controlling and setting of an available wavelength or unused wavelength as taught by

Majima and Nakamura et al to the system of applicant admitted prior art so that the controller can get the reception status information from the receiver, and then desired wavelength for reception and transmitting can be easily and automatically selected based on the received information, and then no man-hours are required while a new remote apparatus is added or updated.

11). With regard to claim 14, the AAPA and Majima and Nakamura et al disclose all of the subject matter as applied to claim 13 above. And the AAPA and Majima and Nakamura et al further disclose wherein said wavelength control means sets the unused wavelength as a transmission and reception signal and outputs a wavelength control signal for setting the unused wavelength (Majima: the dotted line in Figures 1 and 2 indicated the unused wavelength; Figures 2, 4 and 5, the wavelength control system controls the tunable LD driver circuit based on a signal outputted from the discriminator, thereby performing the control of the wavelength, and, column 6, line 54-57; Nakamura et al: e.g., the $\lambda 1$ and $\lambda 2$ in Figure 3 are the unused wavelength, column 6, line 43 to column 7 line 27, and column 8 lien 49-54, and column 11 line 19 to 51 etc).

12). With regard to claim 15, the AAPA and Majima and Nakamura et al disclose all of the subject matter as applied to claim 13 above. And the AAPA and Majima and Nakamura et al further disclose wherein the wavelength control means determines a wavelength of an unreceived optical signal as the unused wavelength and sets the unused wavelength as a transmission and reception wavelength to be used in the remote apparatus (Majima: Figures 1 and 2, the unreceived wavelengths indicated by broken vertical lines are located as the candidates of the transmission wavelength to be

set; ; Nakamura et al: e.g., the λ1 and λ2 in Figure 3 are the unused/unreceived wavelength, column 6, line 43 to column 7 line 27, and column 8 lien 49-54, and column 11 line 19 to 51 etc).

13). With regard to claim 16, the AAPA and Majima and Nakamura et al disclose all of the subject matter as applied to claim 13 above. But the AAPA and Majima and Nakamura et al do not expressly disclose wherein the wavelength control means determines the wavelength of a received optical signal as the unused wavelength and sets the unused wavelength as a transmission and reception wavelength to be used in the remote apparatus.

In Figure 4 of Majima, a star coupler is used so that the optical node receives all existing wavelength, then the optical node must determine an unused wavelength. However, as disclosed by the AAPA, a wavelength demultiplexer can be used to separate the wavelengths from the station apparatus 10, and each remote apparatus (e.g., 20-1) only receives one wavelength. Therefore, it is obvious to one skilled in the art to configure the wavelength controller so that the wavelength determining means determines the wavelength of a received optical signal as the available wavelength and sets the wavelength as a transmission and reception wavelength to be used in said remote apparatus.

14). With regard to claim 20, the AAPA discloses a method for adding a remote apparatus to a wavelength division multiplexing transmission system in which a plurality of remote apparatuses (20-1 to 20-m in Figure 1) are connected to a station apparatus (10 in Figure 1) and communication is performed among the remote apparatuses and

the station apparatus using a given plurality of wavelengths (Background of the Invention: the system is a wavelength multiplexing transmission system, each ONU transmits and receives different wavelength), said method comprising:

selecting a wavelength (e.g., the wavelength demultiplexer 7 in Figure 1 of AAPA);

outputting a reception status signal (the receiver 220-1 to 220-m in Figure 1) receives the selected signal and outputs a reception status signal, based on the status signal, the maintainer/personnel sets the wavelength control means to output a specific wavelength, page 2 line 10 to page 3 line 11);

determining whether the selected wavelength is a used wavelength or an unused wavelength on the basis of said reception status signal (the maintainer/personnel sets the wavelength controller 240-1 to 240-n which controls the wavelengths of optical signals to be transmitted from the optical transmitter 230-1 to 230-n, page 3, line 8-11);

transmitting an optical signal of the unused wavelength determined by the determining step (the optical transmitter 230-1 to 230-m transmits optical signal determined by the controller 240, Figure 1).

The AAPA teaches that the optical transmitter 230-m of the **newly added** remote apparatus 20-m contains a wavelength tunable laser. The output wavelength of the wavelength tunable laser must be **controlled** so as to be the wavelength assigned to the remote apparatus 20-m **through the use of a wavelength controller** (page 3, line 8-11). But, in FIG. 1, each time a new remote apparatus is installed, a wavelength to be used in that system must be set by a maintainer or other personnel.

The AAPA fails to teach: separating an optical signal of a selected wavelength form an optical signal including a plurality of wavelengths; and the reception status signal indicating whether or not a separated optical signal is received; and controlling the wavelength selecting means until the unused wavelength is selected by the selecting step.

However, Majima, in the same field of endeavor, teaches a system and method (Figure 4 and Figure 5) in which a wavelength separating means (e.g., the optical filter 503 in Figure 5) separates an optical signal of a selected wavelength from an optical signal including a plurality of wavelengths, the optical receiving means (the Light Receiving Element and the Discriminator in Figure 5) for outputting reception status signal indicating whether or not a separated optical signal is received from the wavelength separating means (Majima discloses that each sending terminal station performs sweeping to detect any transmission wavelength of another station which may exist on the transmission line, column 9, line 49-54; and FIG. 2A shows two continuous wavelength tunable ranges available on the tunable LD 502. Solid vertical lines show the **used wavelengths**, while broken vertical lines show the **candidate wavelengths or available wavelength**. Majima teaches that the discriminator 508 produces a signal H (digital signal "1") when the level of the input signal is not smaller than the threshold value, otherwise it produces a signal L (digital signal "0")); and wavelength control means for determining an available wavelength as a transmission and reception signal on the basis of said reception status signal (the wavelength control system 501 controls the tunable LD driver circuit 504 based on a signal outputted from the discriminator 508,

thereby performing the control of the wavelength, column 6, line 54-57), and controls the wavelength selecting means until the unused wavelength is selected by the wavelength selecting means (the control system 501 and tunable optical filter driver circuit 505 control the filter 503 to sweep the wavelength to find the available wavelength.

Majima teaches that the transmitting terminal station controls the wavelength tunable optical transmitter such that the transmitter transmits light of a wavelength which is not being used on the network communication transmission line. Majima's method also can be carried out such that the delivery of the output light from the light-emitting means to the transmitting line is prohibited until the wavelength of the output light is set not to interfere with the other light. Thus, the delivery of the output light is controlled to avoid any interference which otherwise may be caused by delivering light of a wavelength which risks interference (column 4, line 30-47). Ref to Figures 1 and 2, wavelengths indicated by broken vertical lines are located as the candidates of the transmission wavelength to be set.

Majima teaches to find the available wavelength. Majima does not expressly state that the available wavelength is the used or unused wavelength.

Another prior art, Nakamura et al, also teaches a system and method which provides a specific signal detection means finding out a communication available wavelength not in use from an available wavelength region at desired transmission and detecting a communication destination specific signal when a communication request is detected. Nakamura et al discloses a wavelength selecting means (e.g., 32 in Figure 1),

wavelength separating means (e.g., 55 in Figure 2), an optical receiving means (the photodiode 54 in Figure 2) for outputting reception status signal indicating whether or not a separated optical signal is received from the wavelength separating means (column 6, line 43 to column 7 line 27, and column 8 lien 49-54); and wavelength control means (the control circuit 51, 112, 605 etc in Figures 2, 5, 7 and 8) for determines whether the selected wavelength is a used wavelength or an unused wavelength on the basis of the reception status signal (Figures 3 and 9-11) and controls the wavelength selecting means until the unused wavelength is selected by the wavelength separating means (column 6, line 43 to column 7 line 27, and column 8 lien 49-54, and column 11 line 19 to 51 etc).

As disclosed by the AAPA, for a conventional system, each time a new remote apparatus is installed, a wavelength to be used in that system must be set by a maintainer or other personnel. And collisions between signals may occur and action must be taken to handle them.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the method and system of autonomously controlling and setting of an available wavelength or unused wavelength as taught by Majima and Nakamura et al to the method and system of applicant admitted prior art so that the controller can get the reception status information from the receiver, and then desired wavelength for reception and transmitting can be easily and automatically selected based on the received information, and then no man-hours are required while a new remote apparatus is added or updated.

15). With regard to claim 21, the AAPA and Majima and Nakamura et al disclose all of the subject matter as applied to claim 20 above. And the AAPA and Majima and Nakamura et al further disclose the method further comprising:

generating and outputting, based on a result of the determining step, a wavelength control signal for setting the unused wavelength; and setting, based on the wavelength control signal, the unused wavelength as a transmission and reception signal (Majima: the dotted line in Figures 1 and 2 indicated the unused wavelength; Figures 2, 4 and 5, the wavelength control system controls the tunable LD driver circuit based on a signal outputted from the discriminator, thereby performing the control of the wavelength, and, column 6, line 54-57; Nakamura et al: e.g., the $\lambda 1$ and $\lambda 2$ in Figure 3 are the unused wavelength, column 6, line 43 to column 7 line 27, and column 8 lien 49-54, and column 11 line 19 to 51 etc).

2. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art and Majima (US 6,101,014) and Nakamura et al (US 5,212,577) as applied to claim 1 above, and in further view of Miyazaki et al (US 2003/0118280).

1). With regard to claim 5, the AAPA and Majima and Nakamura et al disclose all of the subject matter as applied to claim 1 above. But, the AAPA and Majima do not expressly disclose wherein the station apparatus comprises optical control means which determines a wavelength to be used, on the basis of an optical signal received from said remote apparatus.

The AAPA and Majima disclose a wavelength control means for determining an available wavelength as a transmission and reception signal on the basis of said

reception status signal at the remote node. And Nakamura et al actually teaches that the control means can be installed at the station side (Figure 6, 1-1 to 1-n).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use another wavelength control means at the station side. By using the wavelength control means at the station side, the wavelength desired by the remote node can be conveniently obtained, and then, the station apparatus can determine a wavelength to be used on the basis of an optical signal received from said remote apparatus, and output optical signal having the wavelength as determined. Claim 5 is not patentable different from the wavelength controller in AAPA and Majima and Nakamura et al because it is "to duplicate a part for a multiple effect" (see St. Regis Paper Company v. Bemis Company, Inc., 193 USPQ 8 (CA 7 1977)).

Also another prior art, Miyazaki et al, teaches a wavelength controller (the wavelength controller in Figures 1 and 3) at the central station so that the wavelength of the laser 16 is set to a correct position based on the signal from the remote apparatus (40 in Figures 1and 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the wavelength controller as taught by Miyazaki et al to the system of the AAPA and Majima so that the controller can get the information from the receiver, and then desired wavelength for reception and transmitting can be easily and automatically selected based on the received information.

2). With regard to claim 6, the AAPA and Majima and Nakamura et al disclose all of the subject matter as applied to claim 1 above. But, the AAPA and Majima and Nakamura et al do not expressly disclose wherein the station apparatus is arranged to

prevent an optical signal having the same wavelength as an unreceived wavelength from being outputted and outputs an optical signal having the same wavelength as a received wavelength.

The AAPA and Majima disclose a wavelength control means for determining an available wavelength as a transmission and reception signal on the basis of said reception status signal at the remote node.

Also another prior art, Miyazaki et al, teaches a wavelength controller (the wavelength controller in Figures 1 and 3) at the central station so that the wavelength of the laser 16 is set to a correct position based on the signal from the remote apparatus (40 in Figures 1and 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use another wavelength control means at the station side. By using the wavelength control means at the station side, the wavelength desired by the remote node can be conveniently obtained; also by the wavelength control means at the station side, the station side can determine whether a new remote apparatus is added. It also would be obvious to one skill in the art to arrange the station side to output wavelengths to the existing corresponding remote apparatus so to reduce cost and save energy, that is, to output an optical signal having the same wavelength as a received wavelength (based on the received information), and prevent an optical signal having the same wavelength as an unreceived wavelength among wavelengths used in said transmission system from being outputted so to save energy, reduce interference and system cost.

3). With regard to claim 7, the AAPA and Majima and Nakamura et al disclose all of the subject matter as applied to claim 1 above. And the AAPA and Majima and Nakamura et al further disclose wherein said station apparatus comprising:

wavelength demultiplexing means (4 in Figure 1 of the AAPA) which demultiplexes the wavelength of a received optical signal;

optical receiving means (Optical Receiver 111 – 11n in Figure 1 of the AAPA) which receives an optical signal demultiplexed by the wavelength demultiplexing means;

optical transmitting means (Optical Transmitter 101 – 10n in Figure 1 of the AAPA) which transmits an optical signal having the transmission wavelength determined by the optical output control means; and

wavelength multiplexing means (3 in Figure 1 of the AAPA) which multiplexes the wavelength of the optical signal transmitted by said optical transmitting means.

But, the AAPA does not discloses optical output control means which determines, as a transmission wavelength, an optical signal having the same wavelength as that of an optical signal received by the optical receiving means.

The AAPA and Majima disclose a wavelength control means for determining an available wavelength as a transmission and reception signal on the basis of said reception status signal at the remote node. And Nakamura et al actually teaches that the control means can be installed at the station side (Figure 6, 1-1 to 1-n).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use another wavelength control means at the station

side. By using the wavelength control means at the station side, the wavelength desired by the remote node can be conveniently obtained, and then, the station apparatus can determine a wavelength to be used on the basis of an optical signal received from said remote apparatus, and output optical signal having the wavelength as that of an optical signal received by the optical receiving means.

Also another prior art, Miyazaki et al, teaches a wavelength controller (the wavelength controller in Figures 1 and 3) at the central station so that the wavelength of the laser 16 is set to a correct position based on the signal from the remote apparatus (40 in Figures 1and 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the wavelength controller as taught by Miyazaki et al to the system of the AAPA and Majima so that the controller can get the information from the receiver, and then desired wavelength for reception and transmitting can be easily and automatically selected based on the received information.

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LI LIU whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Li Liu
August 24, 2008

/Kenneth N Vanderpuye/
Supervisory Patent
Examiner, Art Unit 2613